RoHS Compliant

USB-Disk Module Ⅱ

Specification

May 5, 2008

Version 1.0

Apacer Technology Inc.
9F, No.100,Hsin Tai Wu Rd. Hsichih, Taipei Hsien 221,Taiwan, R.O.C.
Tel:+886-2-2696-1666 Fax:+886-2-2696-1668
http://www.apacer.com

© 2008 Apacer Technology, Inc.

FEATURES:

- **USB2.0 High-Speed and USB1.1 Full-Speed compatible interface**
- **Capacity**
  - 256, 512MB
  - 1, 2, 4, 8GB[1]
- **Fast sustained read performance**
  - Sustained read: 30 MB/s
- **Fast sustained write performance**
  - Sustained write: 20 MB/s
- **Intelligent USB Module**
  - Implements dynamic wear-leveling algorithms to substantially increase longevity of flash media
  - 4-bit Error Detection Code/Error Correction Code (EDC/ECC)
  - Intrinsic data integrity after power loss
  - Wear leveling algorithm that provides more reliable data storage over an extended period
- **Extended Data Protection (Optional)**
  - Write protection setting by jumper for prevention of data overwrites.
- **Zero Power Data Retention**
  - Batteries not required for data storage
- **Support Ready Boost for Windows Vista**
- **Support boot-up function for OS**
  - Windows XP Embedded
  - Windows CE
  - Linux
- **Temperature ranges**
  - 0°C to 70°C for operation (standard)
  - -40°C to 85°C for operation (ET[2])
  - -40°C to 100°C for storage
- **Low power consumption (typical)**
  - Active mode: 110 mA
  - Sleep mode: 450 μA
- **Connector**
  - 10-pin (2x5) female header
- **RoHS Compliant**

1. Standard Temperature only
2. Extended Temperature

© 2008 Apacer Technology, Inc.

TABLE OF CONTENTS

1. General Description 4

1.1 Performance-optimized Controller 4
1.1.1 Power Management Unit (PMU) 4
1.1.2 SRAM Buffer 4
1.1.3 Error Correction Code (ECC) 4
1.1.4 Wear-Leveling 4
1.1.5 Write Protection Mode (Optional) 4

2. Functional Block Diagram 5

3. Pin Assignment 6

4. Capacity Specifications 7

4.1 Functional Specifications 7
4.2 Environmental Specifications 7

5. Electrical Specification 8

6. Physical Dimension 9

6.1 Horizontal Design 9
6.1.1 Type A (STD 90D) 9
6.1.2 Type B (STD 90D-MH) 10
6.1.3 Type C (STD 90D-MS) 11
6.2 Vertical Design 12
6.2.1 Type D (STD 180D) 12
6.3 Low Profile Design 13

7. Product Ordering Information 15

7.1 Product Code Designation 15
7.2 Valid Combinations 16
7.2.1 Type A (STD 90D) 16
7.2.2 Type B (STD 90D-MH) 16
7.2.3 Type C (STD 90D-MS) 16
7.2.4 Type D (STD 180D) 17

© 2008 Apacer Technology, Inc.

1. General Description

Apacer's USB-Disk Module (UDM) is a high performance, embedded solid state drive (SSD) designed to replace a conventional IDE hard disk drive. UDM SSD can be plugged into a standard Embedded USB connector commonly found in desktops, portable PC systems and industrial PC systems. This product is well suited for embedded flash storage applications offering new and expanded functionality as well as more cost-effective designs, better performance and increased reliability.

1.1 Performance-optimized Controller

The heart of an UDM is the USB controller, which translates standard USB signals into the data and controls of the flash media. This proprietary USB controller is specifically designed to attain high data throughput from host to flash.

1.1.1 Power Management Unit (PMU)

The power management unit (PMU) controls the power consumption of the UDM. It can dramatically extend product battery life by leaving the idle part of the circuitry into sleep mode. The PMU has zero wake-up latency.

1.1.2 SRAM Buffer

The SRAM buffer is a key contributor to the USB controller performance. It optimizes data writes to the flash.

1.1.3 Error Correction Code (ECC)

The UDM uses BCH Error Detection Code (EDC) and Error Correction Code (ECC) algorithms which correct up to four random single-bit errors for each 512-byte block of data. High performance is achieved through hardware-based error detection and correction.

1.1.4 Wear-Leveling

Flash memory can be erased a limited number of times, This number is called the erase cycle limit, or write endurance limit, The erase cycle limit applies to each individual erase block in the flash device.

In a typical application, and especially if a file system is used, specific pages are constantly updated (e.g., the page that contains the FAT, registry, etc.). Without any special handling, these pages would wear out more rapidly than other pages, reducing the lifetime of the entire flash.

To overcome this inherent deficiency, Apacer's USB-Disk Module (UDM) uses wear-leveling algorithm. This wear-leveling algorithm ensures that consecutive writes of a specific sector are not written physically to the same page in the flash. This spreads flash media usage evenly across all pages, thereby maximizing flash lifetime.

The wear-leveling mechanism provides more than 100,000 write/erase cycles for reliable data storage over an extended period.

1.1.5 Write Protection Mode (Optional)

When the device is configured to the Write-Protection mode, it enhances the data security and protection. This feature prevents the stored data from inadvertent system writes or erases, and viruses.

© 2008 Apacer Technology, Inc.

2. Functional Block Diagram

The USB-Disk Module (UDM) contains a controller, embedded firmware, and Flash Media with a female connector. The UDM interfaces with the host system allowing data to be written to and read from the Flash Media.

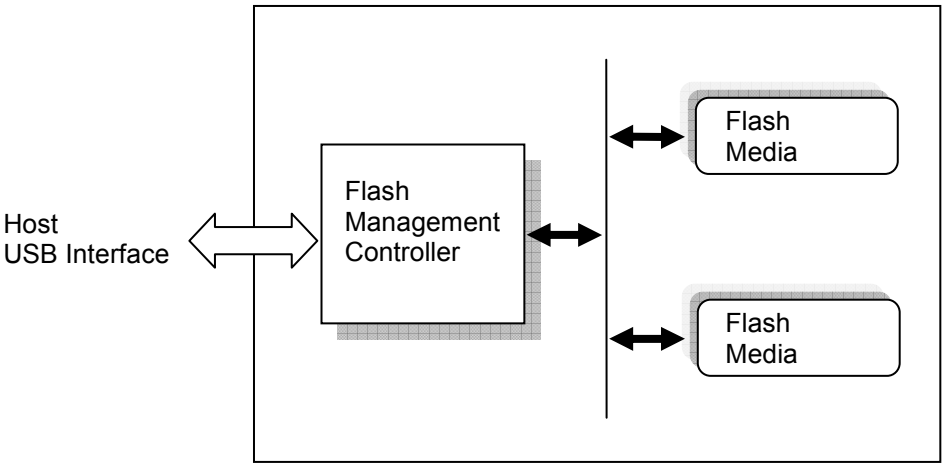


Figure 2-1: Functional block diagram

© 2008 Apacer Technology, Inc.

3. Pin Assignment

This chapter provides the information on the pin assignments and signal descriptions. Table 3-1 lists the pin assignments with respective signal names for the 10-pin configuration.

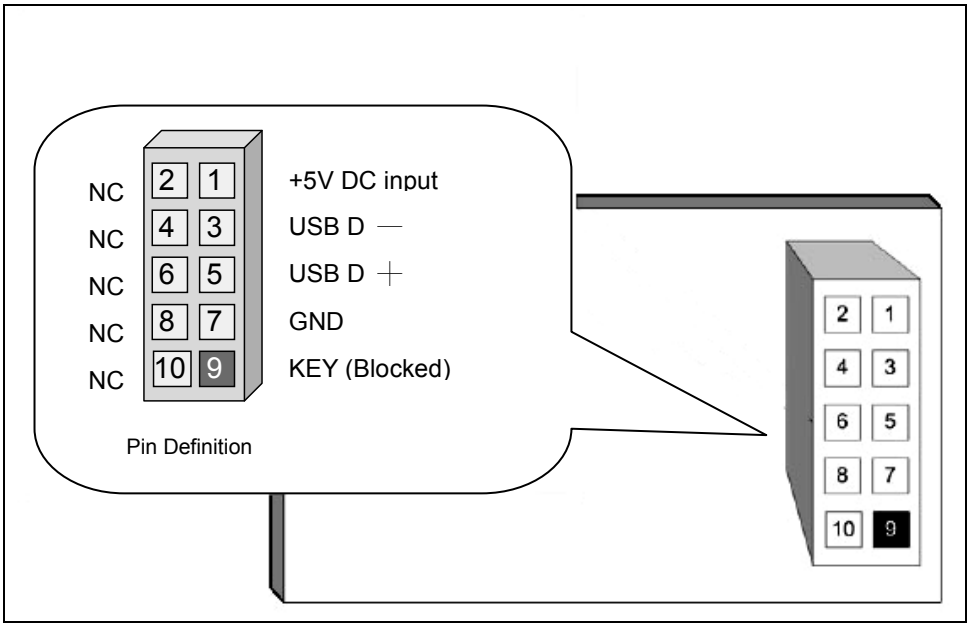


Table 3-1: Pin Assignment of the 10-pin configuration

Pin	Signal	Pin	Signal
1	+5V	2	N.C
3	USB D-	4	N.C
5	USB D+	6	N.C
7	GND	8	N.C
9	Key (Blocked)	10	N.C

© 2008 Apacer Technology, Inc.

4. Capacity Specifications

The USB-Disk Module product family is available as below table matrix.

Table 4-1: Capacity Specification

Density	Total Bytes
256MB	253,739,008
512 MB	511,688,704
1GB	1,027,588,096
2GB	2,059,386,880
4GB	4,118,790,144
8GB	8,237,596,672

4.1 Functional Specifications

Table 4-2: Performance Specifications

	USB 2.0 High-Speed (Max.)
Sustained Read	30 MByte/sec
Sustained Write	20 MByte/sec

4.2 Environmental Specifications

Environmental specification of the USB-Disk Module (UDM) product family which follows the MIL-STD-810F standards is available as shown in Table 4-2.

Table 4-2: Environmental Specifications

Temperature	Operation	0°C to 70°C; -40°C to 85°C (ET[1])
	Storage	-40°C to 100°C
Vibration	10 Hz to 500 Hz, 15G, 3 axes, 30 minutes (IEC 68-2-6)	
Shock	Duration: 11 ms, 50G, 3 axes, 18 times (IEC 68-2-27)	
EMC	FCC, CE	

1: Extended Temperature

© 2008 Apacer Technology, Inc.

5. Electrical Specification

Caution: Absolute Maximum Stress Ratings – Applied conditions greater than those listed under "Absolute Maximum Stress Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these conditions or conditions greater than those defined in the operational sections of this data sheet is not implied. Exposure to absolute maximum stress rating conditions may affect device reliability.

Table 5-1: Operating Range

Range	Ambient Temperature	Voltage
Standard	0°C to 70°C	4.5-5.5V
Extended Temperature	-40°C to 85°C	4.5-5.5V

Table 5-2: Absolute maximum power pin stress ratings

Parameter	Symbol	Min	Max	Unit
Power Supply Input	V_{DD}	-0.3	5.5	V
Voltage on any pin except VDD with respect to GND	V_{IN}	-0.3	5.8	V

© 2008 Apacer Technology, Inc.

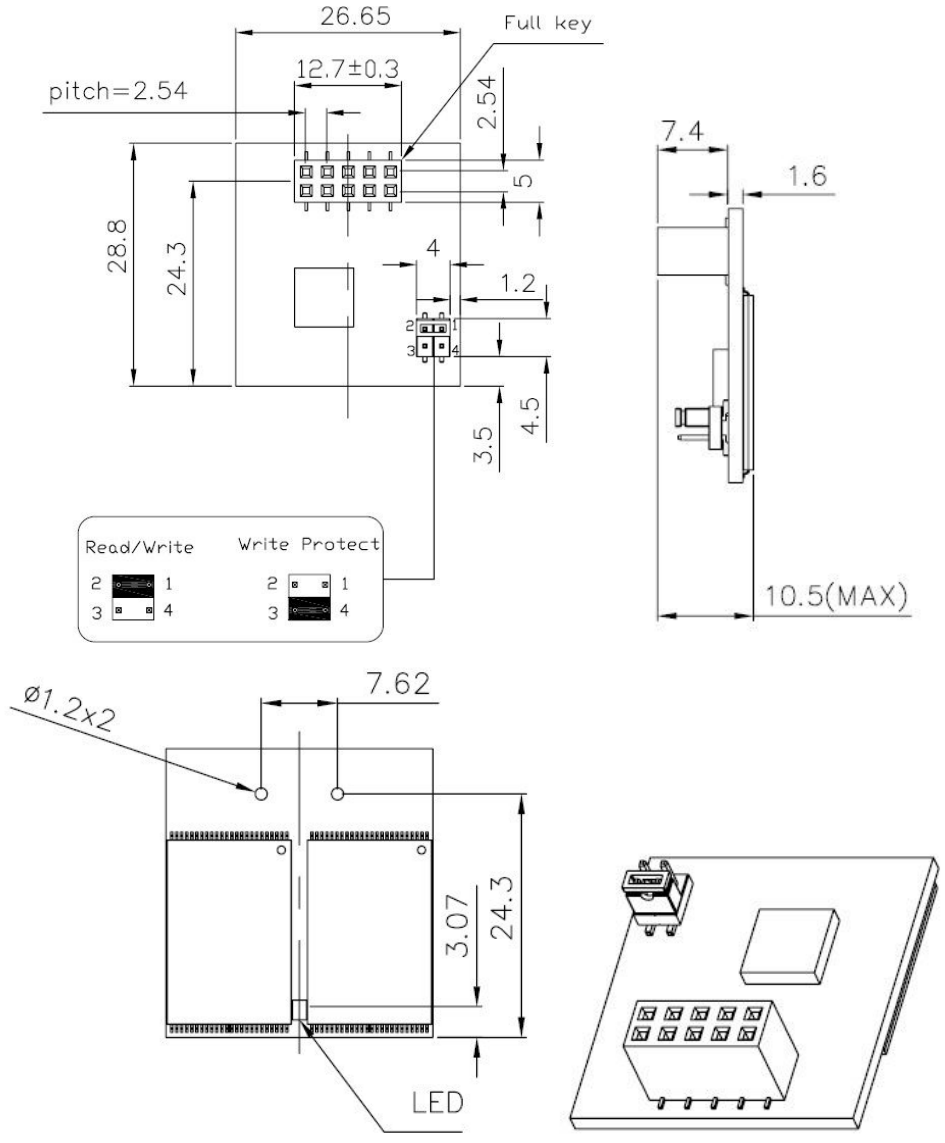
6. Physical Dimension

6.1 Horizontal Design

6.1.1 Type A (STD 90D)

Standard 90 degree

Length	28.8mm	Width	26.65mm	Height (Max)	10.5 mm



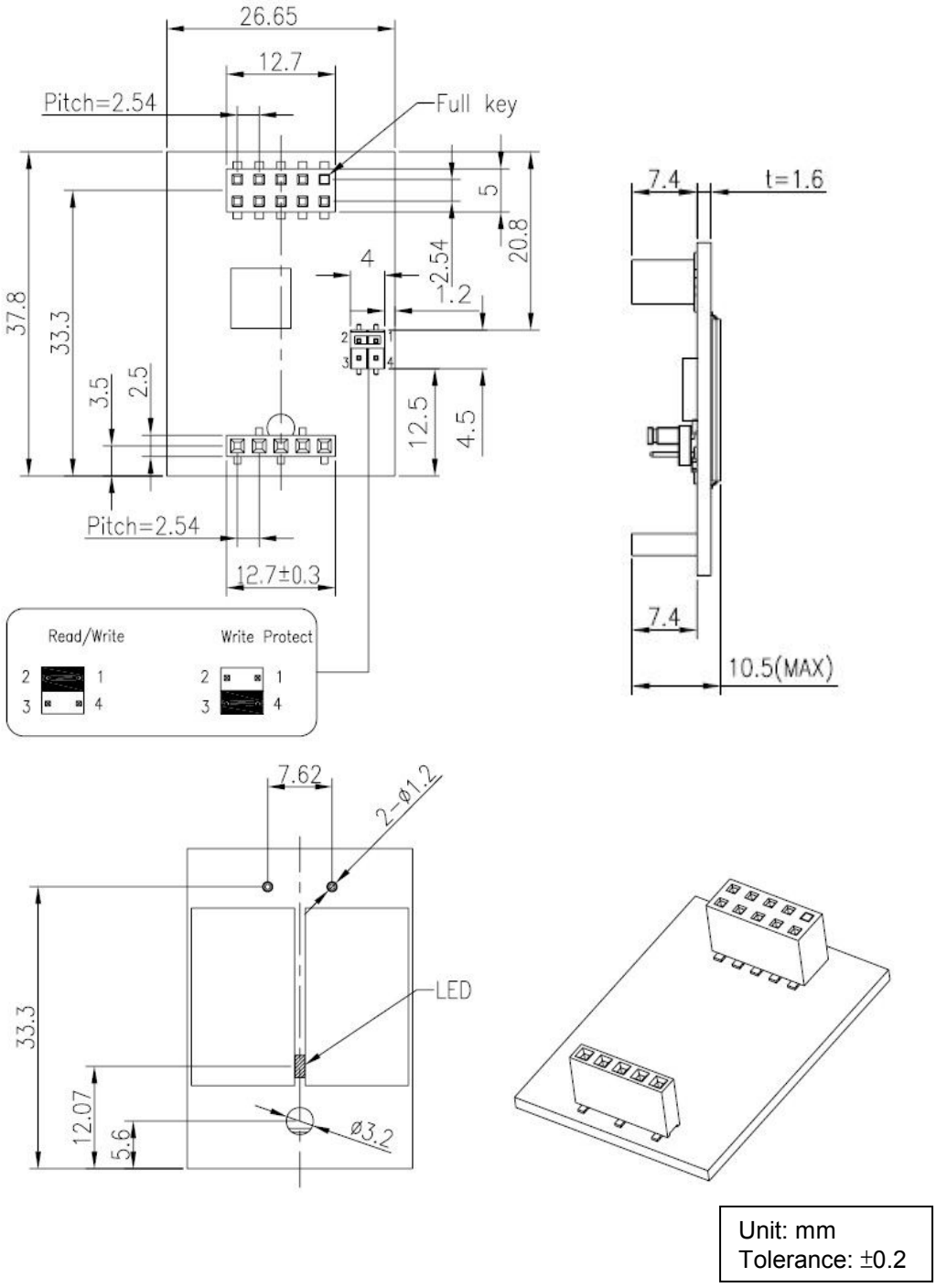
Unit: mm
Tolerance: ±0.2

© 2008 Apacer Technology, Inc.

6.1.2 Type B (STD 90D-MH)

Standard 90 Degree Mounting Header

Length	37.8mm	Width	26.65mm	Height (Max)	10.5 mm



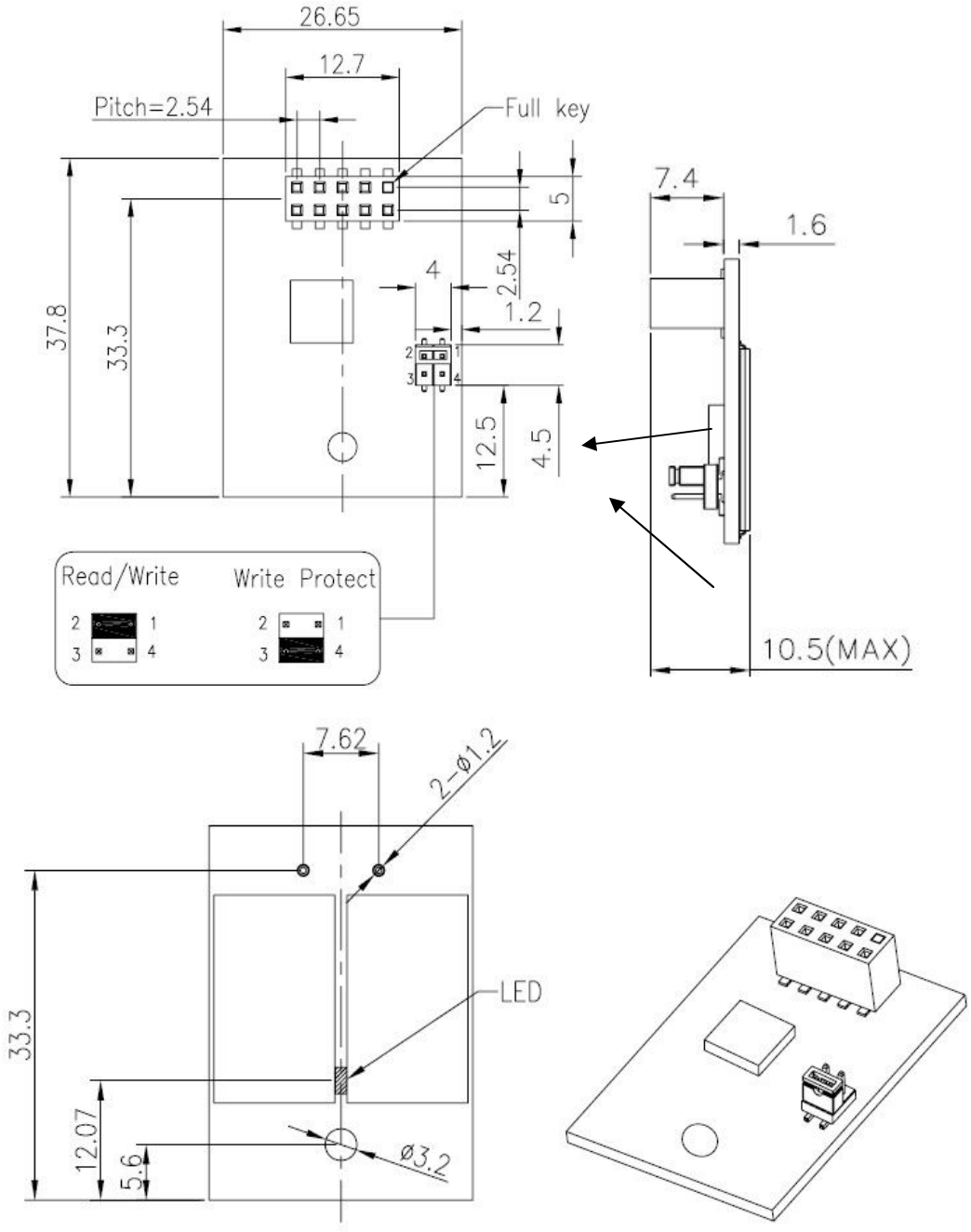
Unit: mm
Tolerance: ±0.2

© 2008 Apacer Technology, Inc.

6.1.3 Type C (STD 90D-MS)

Standard 90 Degree Mounting Screw

Length	37.8mm	Width	26.65mm	Height (Max)	10.5 mm



Unit: mm
Tolerance: ±0.2

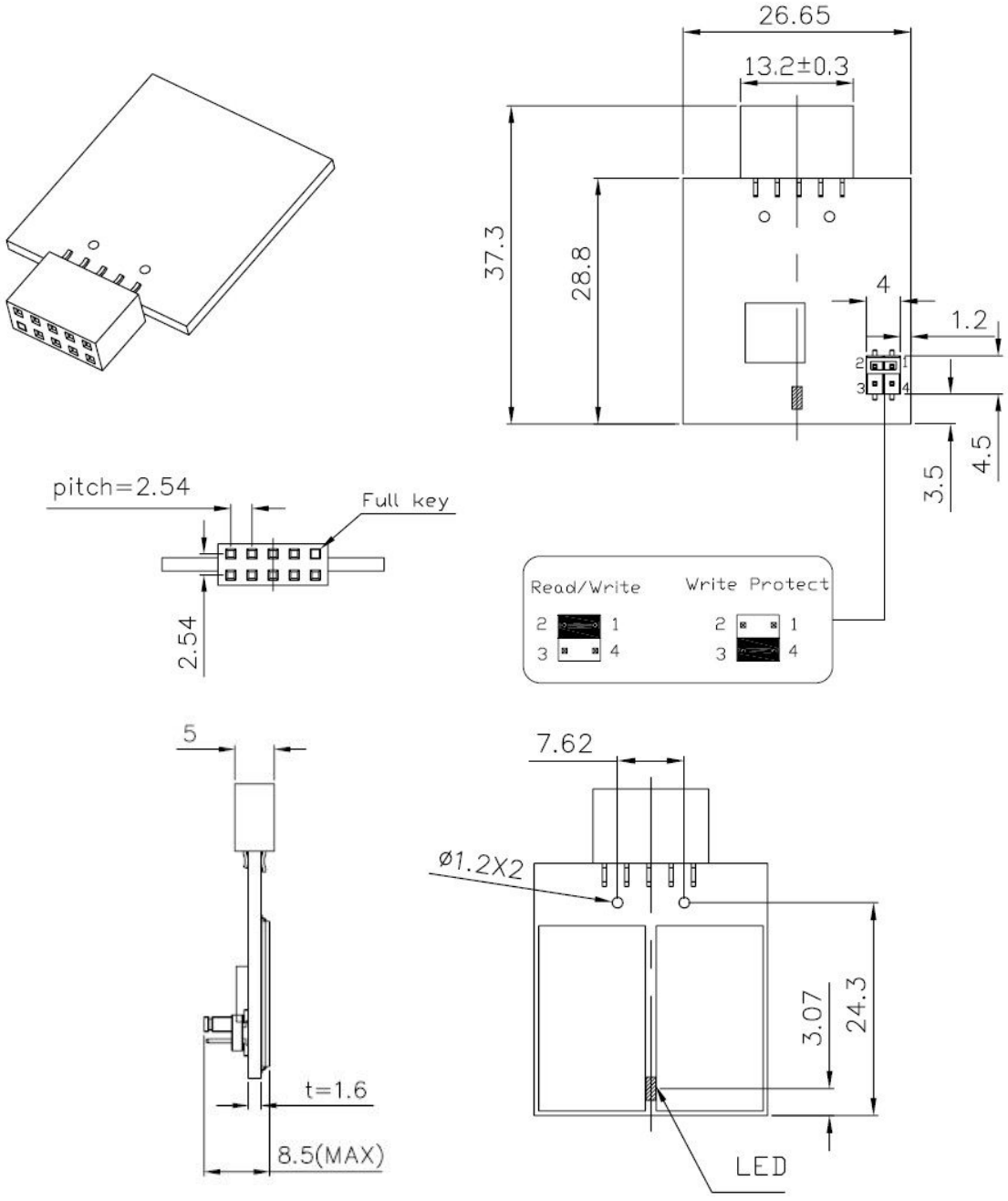
© 2008 Apacer Technology, Inc.

6.2 Vertical Design

6.2.1 Type D (STD 180D)

Standard 180 Degree

Length	37.3mm	Width	26.65mm	Height (Max)	8.5 mm



Unit: mm
Tolerance: ±0.2

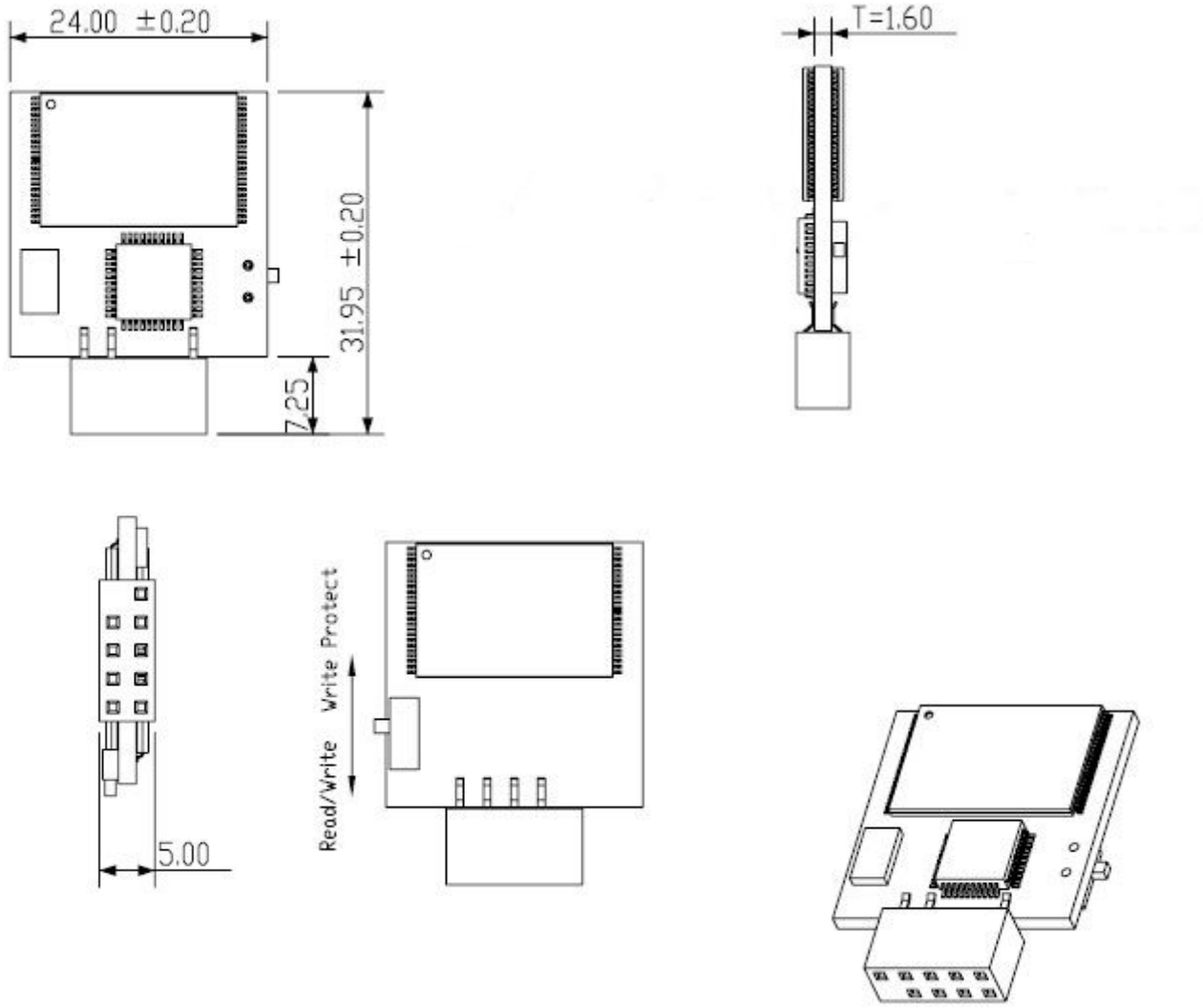
© 2008 Apacer Technology, Inc.

6.3 Low Profile Design

6.3.1 Type D (LP 180D)

Low Profile 180 Degree

Length	31.95mm	Width	24mm	Height (Max)	5 mm



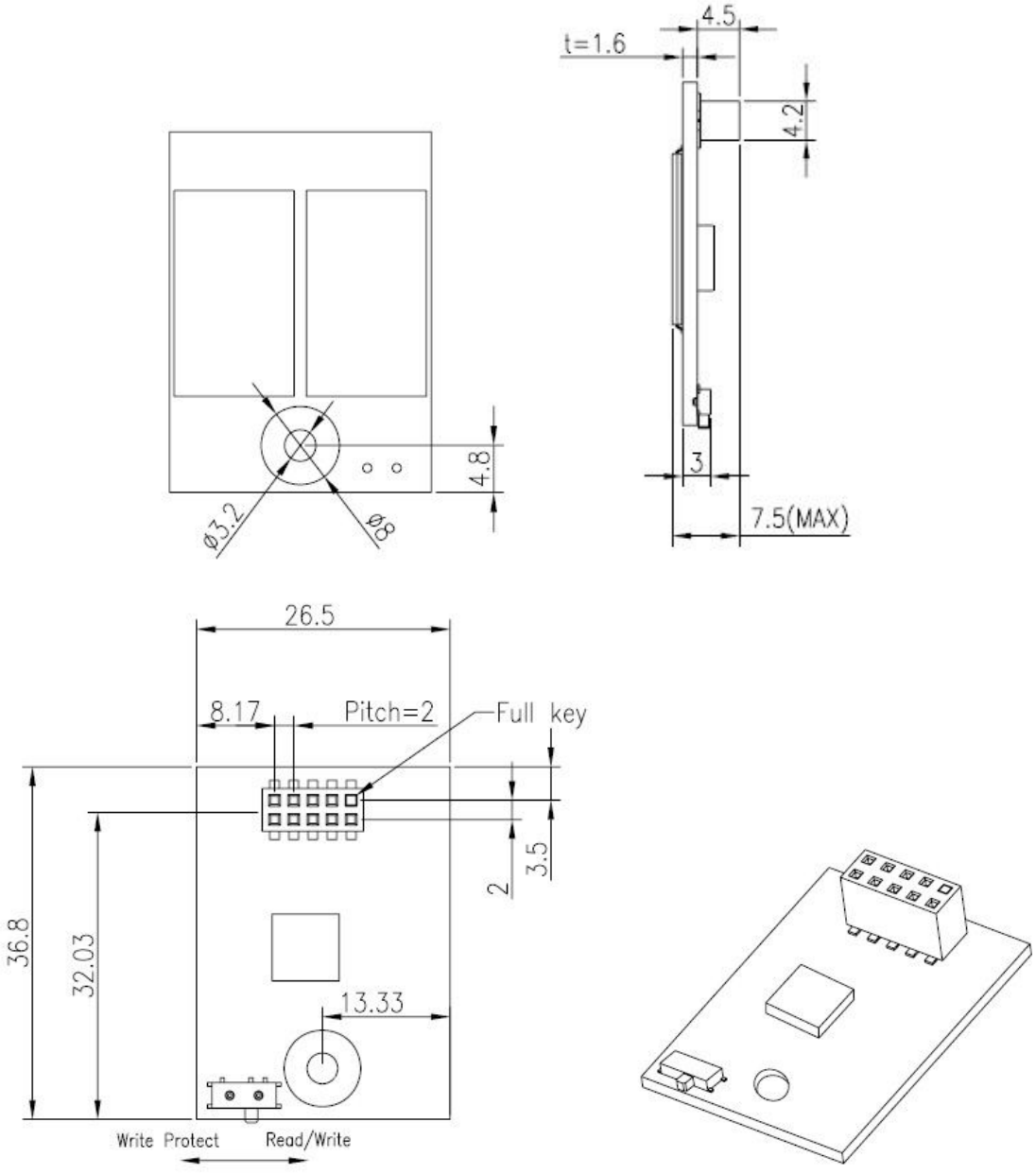
Unit: mm
Tolerance: ±0.2

© 2008 Apacer Technology, Inc.

6.3.2 Type E (LP 90D-MS)

Low Profile 90 Degree Mounting Screw

Length	36.8mm	Width	26.5mm	Height (Max)	7.5 mm



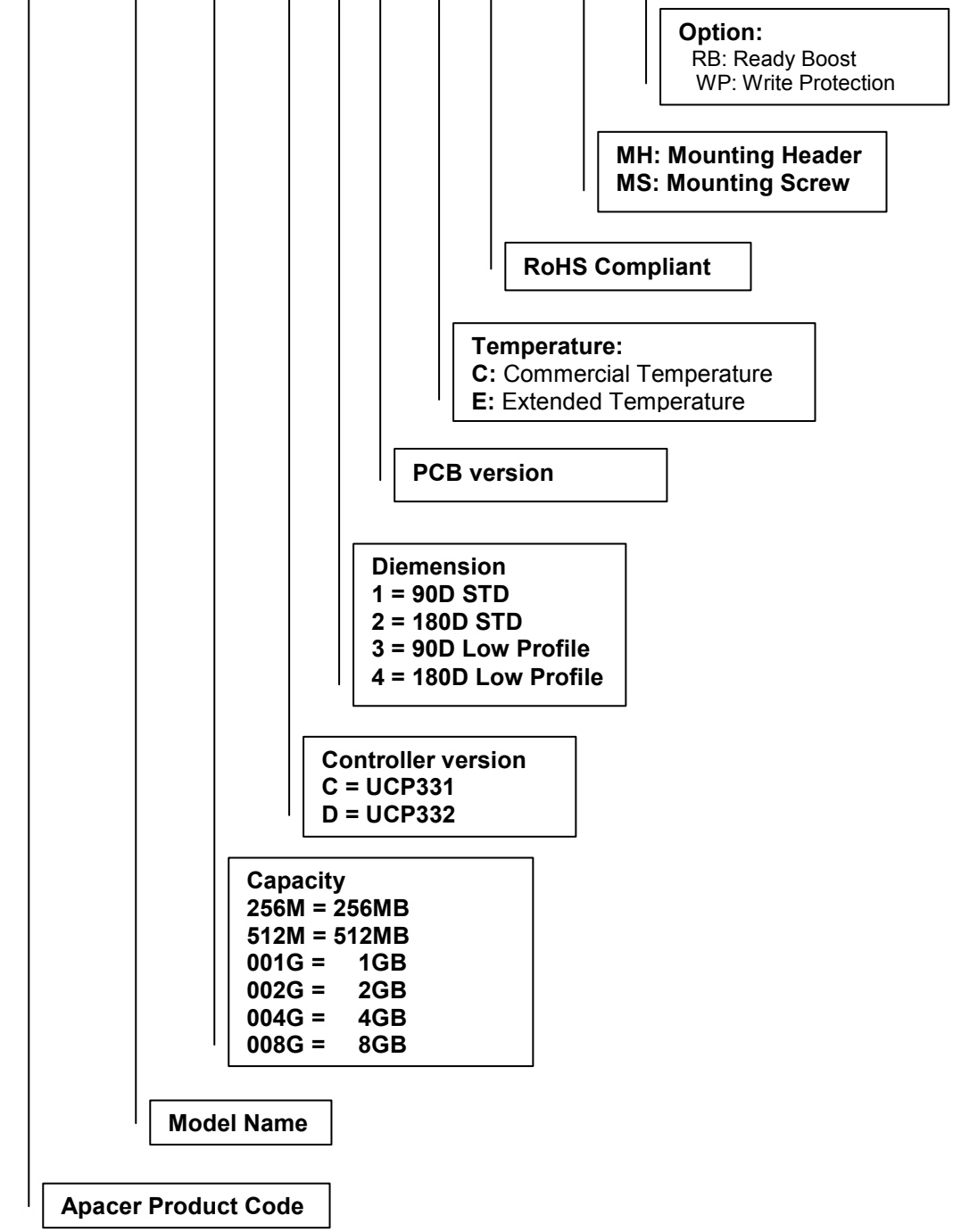
Unit: mm
Tolerance: ±0.2

© 2008 Apacer Technology, Inc.

7. Product Ordering Information

7.1 Product Code Designation

AP – UM xxxx X X X X G – XX XX



© 2008 Apacer Technology, Inc.

7.2 Valid Combinations

7.2.1 Type A (STD 90D)

Standard 90 degree

Capacity	Standard	Extended Temperature
256MB	AP-UM256MC10CG	AP-UM256MD10EG
512MB	AP-UM512MC10CG	AP-UM512MD10EG
1GB	AP-UM001GC10CG	AP-UM001GD10EG
2GB	AP-UM002GC10CG	AP-UM002GD10EG
4GB	AP-UM004GC10CG	AP-UM004GD10EG
8GB	AP-UM008GC10CG	NA

7.2.2 Type B (STD 90D-MH)

Standard 90 Degree Mounting Header

Capacity	Standard	Extended Temperature
256MB	AP-UM256MC10CG-MH	AP-UM256MD10EG-MH
512MB	AP-UM512MC10CG-MH	AP-UM512MD10EG-MH
1GB	AP-UM001GC10CG-MH	AP-UM001GD10EG-MH
2GB	AP-UM002GC10CG-MH	AP-UM002GD10EG-MH
4GB	AP-UM004GC10CG-MH	AP-UM004GD10EG-MH
8GB	AP-UM008GC10CG-MH	NA

7.2.3 Type C (STD 90D-MS)

Standard 90 Degree Mounting Screw

Capacity	Standard	Extended Temperature
256MB	AP-UM256MC10CG-MS	AP-UM256MD10EG-MS
512MB	AP-UM512MC10CG-MS	AP-UM512MD10EG-MS
1GB	AP-UM001GC10CG-MS	AP-UM001GD10EG-MS
2GB	AP-UM002GC10CG-MS	AP-UM002GD10EG-MS
4GB	AP-UM004GC10CG-MS	AP-UM004GD10EG-MS
8GB	AP-UM008GC10CG-MS	NA

© 2008 Apacer Technology, Inc.

7.2.4 Type D (STD 180D)

Standard 180 Degree

Capacity	Standard	Extended Temperature
256MB	AP-UM256MC20CG	AP-UM256MD20EG
512MB	AP-UM512MC20CG	AP-UM512MD20EG
1GB	AP-UM001GC20CG	AP-UM001GD20EG
2GB	AP-UM002GC20CG	AP-UM002GD20EG
4GB	AP-UM004GC20CG	AP-UM004GD20EG
8GB	AP-UM008GC20CG	NA

7.2.5 Type D (LP 180D)

Low Profile 180 Degree

Capacity	Standard	Extended Temperature
256MB	AP-UM256MC40CG	AP-UM256MD40EG
512MB	AP-UM512MC40CG	AP-UM512MD40EG
1GB	AP-UM001GC40CG	AP-UM001GD40EG
2GB	AP-UM002GC40CG	AP-UM002GD40EG
4GB	AP-UM004GC40CG	AP-UM004GD40EG
8GB	AP-UM008GC40CG	NA

7.2.6 Type E (LP 90D-MS)

Low Profile 90 Degree Mounting Screw

Capacity	Standard	Extended Temperature
256MB	AP-UM256MC31CG-MS	AP-UM256MD31EG-MS
512MB	AP-UM512MC31CG-MS	AP-UM512MD31EG-MS
1GB	AP-UM001GC31CG-MS	AP-UM001GD31EG-MS
2GB	AP-UM002GC31CG-MS	AP-UM002GD31EG-MS
4GB	AP-UM004GC31CG-MS	AP-UM004GD31EG-MS
8GB	AP-UM008GC31CG-MS	NA

Note: Valid combinations are those products in mass production or will be in mass production. Consult your Apacer sales representative to confirm availability of valid combinations and to determine availability of new combinations.

© 2008 Apacer Technology, Inc.

Revision History

Revision	Description	Date
1.0	Official Release	May 5, 2008

© 2008 Apacer Technology, Inc.

Global Presence

Taiwan (Headquarters)

Apacer Technology Inc.
9F, 100, Sec. 1, Hsin Tai Wu Rd.,
Hsichih, 221 Taipei Hsien
Taiwan, R.O.C.
Tel: +886-2-2696-1666
Fax: +886-2-2696-1668
amtsales@apacer.com

U.S.A.

Apacer Memory America, Inc.
386 Fairview Way, Suite102,
Milpitas, CA 95035
Tel: 1-408-586-1291
Fax: 1-408-935-9611
sa@apacerus.com

Japan

Apacer Technology Corp.
5F, Matsura Bldg., Shiba, Minato-Ku
Tokyo, 105-0014, Japan
Tel: 81-3-5419-2668
Fax: 81-3-5419-0018
jpservices@apacer.com

Europe

Apacer Technology B.V.
Europalaan 89
5232 BC 'S-Hertogenbosch
The Netherlands
Tel: 31-73-645-9620
Fax: 31-73-645-9629
sales@apacer.nl

China

Apacer Electronic (Shanghai) Co., Ltd
1301, No.251,Xiaomuqiao Road, Shanghai,
200032, China
Tel: 86-21-6226-4722
Fax: 86-21-5206-6939
services@apacer.com.cn

India

Apacer Technologies Pvt. Ltd.
#143, 1st Floor, Raheja Arcade,
5th Block Kormangala Industrial Layout,
Bangalore - 560095, India
Tel: 91-80-4152-9061
sales_india@apacer.com

© 2008 Apacer Technology, Inc.